

## Summary

My research interests broadly lie in computer vision (2D and 3D), medical imaging and machine learning. My recent research focus on (1) Robust and accurate deep learning for non-rigid image registration cross mono-modality, multi-modality, and limited view 2D images to 3D images, and (2) Dynamic subject 3D reconstruction from 2D images or videos (2D tomosynthesis images, ultrasound images and RGBD images).

## Education

Ph.D. in Computer Science	University of North Carolina at Chapel Hill   North Carolina, U.S.	2019-Present
M.S. in Computer Science	University of Southern California   California, U.S.	2010-2012
B.Eng. in Software Engineering	Huazhong University of Science and Technology   Hubei, China	2006-2010

## Publications

**Lin Tian**, Hastings Greer, Roland Kwitt, François-Xavier Vialard, Raúl San José Estépar, Sylvain Bouix, Richard Rushmore, Marc Niethammer. "uniGradICON: A Foundation Model for Medical Image Registration". *In Submission*.

**Lin Tian**, Hastings Greer, Raúl San José Estépar, Soumyadip Sengupta, Marc Niethammer. "NePhi: Neural Deformation Fields for Approximately Diffeomorphic Medical Image Registration". *In Submission*.

**Lin Tian\***, Zi Li\*, Fengze Liu, Xiaoyu Bai, Jia Ge, Le Lu, Marc Niethammer, Xianghua Ye, Ke Yan, Dakai Jin. "SAME++: A Self-supervised Anatomical eMbeddings Enhanced medical image registration framework using stable sampling and regularized transformation". *In Journal Submission*.

Zi Li\*, **Lin Tian\***, Tony CW Mok, Xiaoyu Bai, Puyang Wang, Jia Ge, Jingren Zhou, Le Lu, Xianghua Ye, Ke Yan, Dakai Jin. "SAMConvex: Fast Discrete Optimization for CT Registration Using Self-supervised Anatomical Embedding and Correlation Pyramid". *MICCAI 2023*.

Hastings Greer, **Lin Tian**, François-Xavier Vialard, Roland Kwitt, Sylvain Bouix, Raul San Jose Estepar, Richard Rushmore, Marc Niethammer. "Inverse Consistency by Construction for Multistep Deep Registration". *MICCAI 2023*.

**Lin Tian\***, Hastings Greer\*, François-Xavier Vialard, Roland Kwitt, Raúl San José Estépar, Richard Jarrett Rushmore, Nikolaos Makris, Sylvain Bouix, Marc Niethammer. "GradICON: Approximate Diffeomorphisms via Gradient Inverse Consistency". *CVPR 2023*.

**Lin Tian**, Yueh Z Lee, Raúl San José Estépar, Marc Niethammer. "LiftReg: Limited Angle 2D/3D Deformable Registration". *MICCAI 2022*.

Peirong Liu, **Lin Tian**, Yubo Zhang, Stephen Aylward, Yueh Lee, Marc Niethammer. "Discovering Hidden Physics Behind Transport Dynamics". *CVPR 2021*.

**Lin Tian**, Connor Puett, Peirong Liu, Zhengyang Shen, Stephen R Aylward, Yueh Z Lee, Marc Niethammer. "Fluid Registration Between Lung CT and Stationary Chest Tomosynthesis Images". *MICCAI 2020*.

## Research Experience

### Department of Computer Science, University of North Carolina at Chapel Hill

Chapel Hill, U.S.

Research Assistant, Supervisor: Dr. Marc Niethammer

Aug 2019 - Present

- **Non-rigid deformations:** (1) Research on a novel displacement field-based diffeomorphic transformation method via gradient inverse consistency, leading SOTA performance of 3D registration on Lung, Brain and knee datasets. (2) Study on generalizable **neural deformation field** for high-resolution 3D image registration. (3) Research on universal model for 3D image registration across anatomical regions and motion patterns.
- Motion estimation between 3D and limited view 2D images: Research on estimating motion between 3D CT and limited view 2D tomosynthesis with **differentiable volume rendering** and non-rigid transformation.
- 3D Reconstruction from limited view 2D images: Reconstructing 3D CT from 2D tomosynthesis via differentiable projection operator and radiograph consistency.

### Google X, Alphabet Inc.

Mountain View, CA, U.S.

PhD Residency, Supervisor: Dr. Alexander Zoellner, Dr. Ningrui Li and Dr. Atilla Kiraly

May 2023 - Aug 2023

- 3D Dynamic Subject Reconstruction: Reconstructing 3D dynamic subject from videos using **implicit neural representation and neural rendering**.

### Damo Academy, Alibaba Group

New York, U.S.

Research Scientist Intern, Supervisor: Dr. Dakai Jin, Dr. Ke Yan and Dr. Ling Zhang

May 2022 - Aug 2022

- Self-Supervised Pre-trained Representation: Conducted research on self-supervised pre-trained representation-based **point set registration** and 3D image registration, enhancing registration accuracy and efficiency.
- Optimal Transport in Feature Space: Investigated point set registration via optimal transport in the feature space, contributing to improved alignment and matching in 3D point clouds.

### AI Lab, ByteDance Ltd.

Mountain View, CA, U.S.

Research Scientist Intern, Supervisor: Dr. Imran Saleemi

May 2021 - Aug 2021

- 3D Shape Reconstruction and Novel View Synthesis: Research in 3D **shape reconstruction** and novel view synthesis from RGBD images, leveraging neural representations of **signed distance functions** (SDF) and differentiable volume rendering to advance visual computing technologies.

## Ruijia Technology Inc.

Machine Learning Engineer, Supervisor: Dr. Rong Yuan

Wuhan, China

Mar 2017 - Aug 2019

- **Transfer Learning for Brain Glioma Classification:** Conducted research on using transfer learning techniques to classify brain glioma as abnormal or benign from MRI images, contributing to medical image analysis.
- **Lung Nodule Detection:** Implemented a state-of-the-art lung nodule detection system from CT images using faster R-CNN, improving early disease detection.

## Skills

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**Programming** Python, C/C++, C#, CUDA, CMake, Git, Scripting (Bash), LaTeX  
**Software** Pytorch, Tensorflow, ITK, Scikit-learn, Linux, Unity Engine

## Honors

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2022	<b>Student Travel Award</b> , MICCAI	Singapore
2008	<b>Scholarship of Citizen</b> , Huazhong University of Science and Technology	China
2006	<b>National Scholarship (Top 1%)</b> , Huazhong University of Science and Technology	China
2006	<b>Scholarship of Citizen</b> , Huazhong University of Science and Technology	China
2006	<b>Outstanding Student (Top 1%)</b> , Huazhong University of Science and Technology	China

## Academic Services

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2024	<b>Reviewer</b> , AAAI
2023	<b>Reviewer</b> , MICCAI
2023	<b>Reviewer</b> , Medical Image Analysis
2023	<b>Reviewer</b> , IEEE Transactions on Medical Imaging
2023	<b>Reviewer</b> , IEEE Transactions on Pattern Analysis and Machine Intelligence
2022	<b>Reviewer</b> , ECCV
2020	<b>Reviewer</b> , Medical Image Analysis

## Other Experience

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### Lilith Games

Shanghai, China

*Virtual Reality Game Producer* | PongIt!VR (Steam)

May 2015 - Feb 2017

- **Project Initiation and Team Building:** Initiated the project and assembled a five-member team. Successfully collaborated with the marketing team to launch the game on Steam.
- **Market Analysis and Strategy:** Conducted in-depth research on VR/AR devices and game markets to influence game positioning and design.
- **Business Development and Partnerships:** Drove strategic alliances with major VR device companies, such as Oculus, HTC, and SONY, resulting in successful development and publishing agreements.
- **Leadership and Project Management:** Led regular team meetings and oversaw the end-to-end game production process, ensuring the achievement of project milestones.
- **User Metrics and Growth Strategy:** Monitored and analyzed user metrics related to acquisition and retention. Proposed and implemented innovative features and content enhancements, leading to a tenfold increase in the user base.

### Lilith Games

Shanghai, China

*Senior Game Designer* | Soul Hunters (iOS & Android), Most profitable game in China 2014

May 2015 - Feb 2017

- **Gameplay System and Campaign Design:** Designed engaging gameplay systems and campaigns to consistently maintain user activity and retention, enhancing the overall user experience.
- **Cross-Functional Collaboration:** Collaborated seamlessly with engineers, UI designers, artists, and QA teams to ensure the successful development and delivery of new gameplay systems and campaigns.
- **Data Analysis and User Retention Strategies:** Implemented data analysis scripts to collect and analyze user data, allowing for data-driven decision-making and the formulation of effective user retention strategies.

### Netease Games

Shanghai, China

*System Designer* | My Love from the Star (iOS & Android)

Jun 2014 - May 2015

- **Gameplay Design:** Developed and designed core gameplay mechanics, enhancing the player experience and engagement.
- **Market Analysis and Positioning:** Conducted in-depth market analysis under the supervision of the producer to refine the game's market positioning and strategy, contributing to its success.
- **Resource Management:** Managed and supervised the production progress and cost of art resources, ensuring efficient resource allocation and project cost-effectiveness.

### Disney Interactive Media Group

Los Angeles, CA, U.S.

*Game Development Engineer* | Stack Rabbit (iOS & Android)

Jun 2012 - May 2014

- **Player Progression and UI System Development:** Designed and implemented a player progression system and user interface (UI) using **C#** within **Unity3D**, enhancing user engagement and gameplay experience.
- **Production Infrastructure Optimization:** Engineered an internal production infrastructure, enabling artists to efficiently preview, adjust, and deploy art assets within the project, resulting in a significant reduction in asset deployment time.
- **Version Control and Continuous Integration Expertise:** Designed and maintained a robust **Git** version control workflow and implemented continuous integration processes using **Jenkins**, enhancing project collaboration and ensuring code stability.
- **Game Packaging and Delivery Management:** Managed the packaging of the game for **iOS** and **Android** platforms and efficiently delivered updates to the publishing team, ensuring the timely release of game updates and minimizing delivery errors.

## Disney Interactive Media Group

Los Angeles, CA, U.S.

Game Development Engineer | Where's My Water (iOS & Android), 2012 Apple Design Award

Jun 2012 - May 2014

- **Gameplay Feature Development in C++:** Spearheaded the implementation of innovative gameplay features using C++, enhancing the user experience and gameplay depth.
- **Optimization of 2D Sprite Rendering:** Successfully maintained and optimized the 2D sprite **rendering pipeline** within our in-house **game engine**, resulting in improved rendering performance and visual quality.
- **Integration of Third-Party APIs:** Expertly integrated third-party APIs for authentication and in-app purchases, including Facebook authentication, Apple In-App Purchasing, and Kindle In-App Purchasing, expanding the game's functionality and monetization capabilities.